COMPARISON OF PHYSIOLOGICAL VARIABLES AND HEALTH OUTCOMES AMONG SWIMMERS AND FOOTBALL PLAYERS IN THE STATE OF MAHARASHTRA

A

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CHAPTER -I

INTRODUCTION

Sport and exercise scientists involved in football & Swimmers research have been investigating the multitude of factors that contribute to the performance of a player (Rey et al., 2012). Swimmers is a unique activity carried out in a unique environment, and compared to terrestrial activities is more interesting from the physiological, and especially the biomechanical standpoint. The physics of Swimmers and the nature of Swimmers pools also make quantification of important parameters that determine aquatic performance difficult to measure. Swimmers performance depends on the interplay between biomechanical (stroke frequency, distance/stroke, maximal mechanical work per unit distance and efficiency) and bioenergetics aspects (energy derived from the anaerobic stores, maximal aerobic power, and the time constant with which V'O2max is attained at the onset of exercise). Considerations of motor learning and psychological factors are important and will be discussed in the paper by Mason in this collection. Energy cost is a key parameter to evaluate performance in Swimmers and it has been described as a predictor of performance in human locomotion, in both terrestrial and Swimmers environments (di Prampero, 1986; Zamparo et al., 2005b). Traditionally, the energy cost of Swimmers (Cs) is defined as the total energy expenditure required for displacing the body over a given unit of distance (di Prampero et al., 1986; Pendergast et al., 2003). it is also important that anaerobic metabolism is also taken into account (Barbosa et al. 2005b, Barbosa et al., 2006), since its relatively higher contribution during 100- m distance. Swimmers is an individual or team sport that requires the use of one's entire body to move through water. Competitive Swimmers is one of the most popular Olympic sports,with varied distance events in butterfly, backstroke, breaststroke, freestyle, and individual medley. The majority of studies that assess the oxygen consumption (VO2) kinetics in Swimmers are conducted at the moderate and heavy intensity domains; at faster paces, VO2 dynamics assessment is still scarce and a challenging task. Despite it has been suggested that aerobic energy contribution is greater than 50% even at short duration efforts, little is known about the relative contribution of the different energy systems at short aquatic distances. In addition, the contribution of the legs action on Swimmers propulsion is often depreciated due to the additional energy expenditure, without evident benefits for propulsion; however, over short

duration Swimmers, exercise economy is usually assumed to be of secondary importance. Competitive aquatic is one of the popular sports to be researched extensively. The Swimmers environment presents specific challenges for humans. Hence, researchers are constantly willing to have a deeper insight into human performance in water.

Physiological need of competitive football in highest level must have good physical condition in order to give maximal effort in a football match (run, hold the ball, passing and shooting). The fitness level optimization is a important aspect in the preparation of a team before joining the competition. Football requires a variety of physical attributes and specific playing skills, therefore participants need to train and prepare to meet at least a minimum set of physical, physiological and psychological requirements to cope with the demands of the game and to reduce the risk of injury. It is an enjoyable and social sport than can be played from childhood to old age, either at a recreational level or as competitive sports. Football playing largely involves starting, running, slopping, twisting, jumping, kicking, and turning movements (Waston 1993). Football is one of the most popular sports in the world. Currently FIFA Unifies 203 National associations and represents about 200 million active players of which about 40 million are women. One athlete plays on average 100 hours of football per year. From 50 hours per players of a local team up to 500 hours per player for a professional team. Football is an intermittent sport in which the aerobic energy system is highly taxed with average and peak heart rates around 85% and 98% of maximal values, respectively (Reilly & Thomas, 1979; Ekblom, 1986; Ali & Farally, 1991; Bangsbo, 1994; Krustrup et al., 2005), corresponding to average oxygen uptake (VO_2) around 70% of maximum oxygen uptake (VO_2Max). This suggestion is supported by the finding of core temperatures in the range of 39–40°C during a game (Ekblom, 1986; Mohr et al., 2004).

More important for performance than average oxygen uptake during a game may be the rise in the rate of oxygen uptake during many short intense actions. A player's heart rate during a game is rarely below 65% of HRmax, suggesting that blood flow to the exercising leg muscles is continuously higher than at rest, which means that oxygen delivery is high. However, the oxygen kinetics during changes from low- to high-intensity exercise during the game appear to be limited by local factors and depend on, among other factors, the oxidative capacity of the contracting muscles (Bangsbo et al., 2001; Krustrup et al., 2004; Nyberg et al., 2010). The rate of increase in oxygen uptake can be changed by intense interval training (Krustrup et al., 2004).

The observation that elite football players perform 150–250 brief, intense actions during a game (Mohr et al., 2003) indicates that the rate of anaerobic energy turnover is high during periods of a game. Even though this has not been studied directly, intense exercise during a game would lead to a high rate of creatine phosphate (CP) breakdown, which to a great extent is re-synthesised in the following low-intensity exercise periods (Bangsbo, 1994). Measurements of CP in muscle biopsies obtained after intense exercise periods during a game have shown values around 75% of the level at rest. This figure is, however, likely to be significantly lower during the match, as these values were obtained from biopsies taken 15–30 seconds after match activities, during which a substantial re-synthesis of CP had undoubtedly occurred (Krustrup et al., 2006). Using proper values for re-synthesis of CP, it may be expected that during parts of a game, when a number of intense bouts are performed with only short recovery periods between, CP levels are below 30% of resting level.

Statement of the problem :

Swimmers and Football are the most popular sports in the world. Both requires a variety of physiological efficiency but both game differ from their skills and technique .In the light of the above, the investigator becomes interested in determining the physiological efficiency and health outcomes among aged group Swimmers and football players. The problem will be stated "Comparison of physiological efficiency and health outcomes among aged group Swimmers and football players in the state of Maharashtra"

OBJECTIVES OF THE STUDY

The objectives of the study are given as under:

Primary Objective

The primary objective of the study was to compare the physiological efficiency and health outcomes between aged group Swimmers and football players.

Secondary objectives

The secondary objective of the study is to determine the physiological efficiency and health outcomes between aged group Swimmers and football players.

HYPOTHESIS

The following hypotheses formulated for the present study.

1) There would be a significant difference of physiological Variable between Swimmers and football players.

2) There would be a significant difference of and health outcomes between Swimmers and football players

3) There would be a significant difference of Systolic Blood pressure between Swimmers and football players

4) There would be a significant difference of Diastolic Blood pressure between Swimmers and football players

5) There would be a significant difference Resting heart rate between Swimmers and football players

6) There would be a significant difference of Respiratory rate between Swimmers and football players

7) There would be a significant difference of Breath holding capacity (Inspiration).between aged group Swimmers and football players

8) There would be a significant difference of) Breath holding capacity (Expiration). Swimmers and football players

9) There would be a significant difference of Respiratory rate between aged group Swimmers and football players

DELIMITATIONS OF THE STUDY

1. The study was delimited to Swimmers and football players.
2. The study was delimited to only state level / university level Swimmers and football players.

A) Blood Pressure:-
   a) Systolic Blood Pressure

b) Diastolic Blood Pressure

B) Physiological efficiencies:-

a) Resting heart rate
b) Respiratory rate.
c). Breath holding capacity (Inspiration).
d) Breath holding capacity (Expiration).

C) Health Outcomes Questionnaires.

LIMITATIONS OF THE STUDY

There are a number of limitations restricting the generalize ability of this study are as

1) Since the trainees belong to different level of performance hence the prior Experience of the players may be considered as limitation of the study.
2) Since the trainer belonged to different training this may be also considered as Limitation of the problem.
3) There was no control of research scholar on the diet of the subjects.
4) The effect of weather conditions was considered as limitations.
5) No motivation techniques were used during administrating the test.
6) A limitation of this study is that it reflects the findings of some young adults; the data was collected in selected population, the results may not be generalized to country.
7) Health outcomes and its effects were self-reported by young adults and that may have resulted in some reporting bias. To keep the student data-collection time within reasonable limits, information on health outcomes was also self-reported and no special psychometric instruments were used to measure it. Hence there may have been some misreporting on the magnitude of the problem. Future research is warranted on estimating the level of health outcomes by psychometric instruments.

DEFINITION & EXPLANATION OF TERMS

Physiological Efficiency:

Ability to Physiological work capacity of human body system.

Resting Heart Rate:

The heart rate is differenced as the frequency or number of heart in one minute.

Respiratory Rate:

It is deficient as the total number if breathe in one minute.

Breath Holding Capacity (Expiration):

The time for which one can hold air after full expiration is called breathing holding capacity after expiration.

Breathing Holding Capacity (Inspiration):

The time for which, one can hold air after inspiration.

Blood Pressure:

The blood pressure is the pressure of the blood within the arteries. It is produced primarily by the contraction of the heart muscle**.**

Body Mass Index:

Body Mass Index was measured by individual's body mass divided by the square of his height.

Health related physical fitness Programme:

The health related physical fitness programme was designed by the investigator. The health related physical fitness programme includes exercise in aerobic nature.

Health outcomes:

The term refers to the impact healthcare activities have on people on their symptoms, ability to do what they want to do, and ultimately on whether they live or die. Health outcomes include whether a given disease process gets better or worse, what the costs of care are, and how satisfied patients are with the care they receive. It focuses not on what is done for patients but what results from what is done.

General health perceptions:

Believes personal health is excellent.

Physical functioning:

Reforms all types of physical activities including the most vigorous without limitations due to health.

Social functioning:

Performs normal social activities without interference due to physical or emotional problem.

Bodily pain:

Very severe and extremely limiting pain.

Vitality

Feels tired and worm out all of the time

Role limitations due to physical problems:

Problems with work or other daily activities as a result or physical health.

Role limitation due to emotional problems:

Problems with work or other daily activities as a result of emotional problems.

General mental health:

Feels peaceful, happy and calm all of the time past 4 weeks.

Young adults:

Young adults are defined as people between 18 and 35 years of age. This group includes people who are College students at any institution of higher education

SIGNIFICANCE OF THE STUDY: -

1. This study would help the physical educator to know the importance of health-related fitness programme.
2. The results of present study would also help physical educationist to give an appropriate training programme to the people.

3. The findings of the study would help trainers, physical education teachers & players to improve physiological functions.

4. This study may motivate other investigators to take up similar studies selecting more number of young adults.

5. The present study is under taken to assess the effects of therapeutic exercise and health related physical fitness programme which about the existence of knowledge is a greatest significance of the study.

6. This study is significant to future work in the field of Health education and Social Science to be of great use and importance to the individuals, Psychologist, Teachers, Scientist Educationist as the same can be utilized in formulating the modalities in putting their knowledge acquired through devoted scientific investigations, analysis and interpretation of findings to use of all people.

7. The results of this study may also help to contribute the enhance the health outcomes in individuals particular and other people in general.

8. The results of the study would add further scholarly knowledge to the existing literature of social sciences.

CHAPTER II

REVIEW OF RELATED LITERATURE

The following review of related literature selected for the present study are as follows:

Casajus (2001) studied on fifteen Spanish First Division (La Liga) professional soccer players to evaluate seasonal variation in anthropometric variables adopted by standard techniques (ISAK). The results revealed that there were no significant variation in body mass, although fat percentage and sum of six skin folds were significantly ($P < 0.05$) decreased during competition season. Mesomorphic somatotype (Health-Carter) was observed throughout the season.

Duraskovic et al. (2004) studied on seven hundred twelve soccer players in the 2002 FIFA World Cup championship to analyze height and body mass as well as weight-height relationship. The age of the players ranged from 18 to 39 years. The average age, height and body mass of the players were 27.49 ± 3.87 yrs, 180.90 ± 6.13 cm. and 75.91 ± 6.38 kg respectively. Goalkeepers were taller and had higher body mass (185.42 ± 5.27 cm and 81.62 ± 6.30 kg) and forwards had lowered in age and body mass (25.71 ± 1.16 yrs and 73.87 ± 5.55 kg) than other positional players.

Bandhopadhyay (2007) compared anthropometric profile of forty six football and eighty two volleyball state level players. The mean age of the soccer and volleyball players were 22.00 ±1.69 yrs and 22.30 ±1.36 yrs respectively. The height, body mass and BMI of the footballers and volleyballers were 166.00 ± 4.31 cm. vs. 173.10 ± 4.19 cm., 56.53 ± 7.62 kg. vs. 58.87 ± 6.94 kg. and 20.56 ± 1.89 vs. 19.59 ± 1.57. The study found that soccers and volleyballers both were ectomorphic mesomorph.

Cantoret al. (2008) studied on seven hundred thirty six professional soccer players from 32 teams in 2006 FIFA world cup. The purpose of this study was to identify the body mass index trends of the players. The findings revealed that team body mass index ranged 82.6% – 100% was normal. The overweight players ranged 0% – 12%. The underweight and obese players were 1% each in every team. Goalkeepers were found 85% normal with 14% overweight, defenders were 93% normal and 6% overweight, midfielders 94% normal and 5% overweight, and forwards 92% normal and 5% overweight.

Reddy (1975) conducted a comparative study on selected motor ability components between college level thirty soccer's, thirty hockey's and thirty hand ball players. The age of the players ranged between 18 to 25 years. The results found that footballers had greater agility, speed, cardio-respiratory endurance and lesser pulse rate than hockey and hand ball players. Cassel (1979) compared the motor ability and physical characteristics of University soccer players by position of play. The results showed that fullbacks had more leg power in respect of forwards, the halfbacks were found more skillful than forwards and fullbacks. In speed forwards were significantly faster than halfbacks and fullbacks. No differences were found in agility, upper body strength and endurance ability. THOMAS and REILLY (1979) conducted a study on thirty one English First division players.The age of the players was ranged between18 to 29 yrs. Twenty six test items (fifteen anthropometry, two blood pressure, four muscular strength and power and five cardiac functions) were administered during the week prior to the commencement of the league season (T1). Tests were repeated after an interval of 16 weeks at mid season (T2) and again 21 weeks later (T3) after the final match of the playing season. Significant analysis was found of T1 / T2 data for resting heart rate ($P < 0.01$), Harvard index ($P < 0.01$), maximal heart rate ($P < 0.01$). Differences in the T2 / T3 analysis were significant for vertical jump ($P < 0.01$) and standing broad jump ($P < 0.05$).

Ramaden (1985) examined the maximal oxygen consumption (Vo2 max) and maximal anaerobic power of Kuwaiti world cup soccer players. The Kuwaiti teams exhibited aerobic (51.9 ml/kg min) and anaerobic (119.6 kg/m/sec) power and both values being significantly higher than national level players in Kuwait. DUNN and FAIT (1989) conducted a comparative study on agility, speed, leg power and cardiovascular endurance of English First division defensive and offensive soccer's. The results found that defensive players were taller and had more leg muscles power than offensive players. Offensive players were faster and had more endurance than defensive players. There was no significant difference found in agility between offensive and defensive players.

Bamgsboo (1994) studied on VO2 max of eighty four elite soccer athletes in relation to intensity of soccer match performance. The results of the study showed that good cardio-respiratory fitness was important to support soccer players to play as long as possible the match lasted and involved intermittent anaerobic bursts throughout the game.

Wisloff et al. (2004) studied seventeen international male soccer players to determine the relationship between maximal strength with sprint and vertical jump height. The mean age of the players were 25.8 ± 2.9 yrs and height 177.3 ± 4.1 cm and weight 76.5 ± 7.6 kg. The results found that there was a strong correlation between maximal strength in half squats and

sprint performance and jumping height. Rahnama et al. (2005) studied on forty one English professional soccer players to determine asymmetry in strength and flexibility in the legs of soccer players. The mean of age, height and body mass of the players were recorded as 23.4 ± 3.8 yrs, 1.81 ± 0.06 cm., 81.7 ± 9.9 kg respectively. In both cases knee flexors and dynamic central ratio were significantly higher of non preferred leg than the preferred leg ($P < 0.005$). No significant differences were found in flexibility of hip joint between the preferred and non-preferred leg ($P < 0.05$). Senel (2006) studied one hundred four Turkish soccer players age ranged between 21-32yrs to find out the relationship between auditory reaction time and visual reaction time in a 20 meter sprint test. The results showed that auditory reaction time was significantly higher than visual reaction time in this study.

Das (2007) conducted a study to compare the pre-exercise heart rate, VO2max, anaerobic power, agility, leg muscles power between state level footballers and sprinters of Kolkata. The mean age of the subjects was 22.05 ± 1.62 yrs. The results revealed that there were no significant differences in pre-exercise heart rate, VO2max and anaerobic power. Sprinters showed significantly higher value in leg muscles power than footballers and footballers were significantly higher score in agility.

Aguair et al. (2008) studied the 12 weeks effect of two different training interventions (Intermittent versus Continuous Training) on professional male soccer players. Thirty four players were divided into two equal groups. The results showed that both training interventions were able to maintain initial values of speed and jump height. The intermittent training exhibited significantly larger improvements in repeated sprint ability. The intermittent high intensity training was significantly more beneficial to prepare soccer players according to the game cardiovascular and metabolic specific demands.

Matheson studied the relationship between aquatic and selected physiological and anthropometric development and skills variables in 10-20 years old female competitive swimmers were determined. Forty girls were tested and measured over selected variables each also completed 400 yard and 50 yard time trials. Swimmers were classified into two groups, top and bottom level group. The intercorrelation matrix indicated that best predictions of aquatic performance were height, aerobic capacity and stroke efficiency. Body size skill and exposure of aquatic were most significant groups of factors in differentiating between both.

CHAPTER III

METHODOLOGY

This chapter explained the methodological details used to implement the study. Specifically, presented the general perspective and context of the study, an overview of the participants and a description of the procedures used in data collection, and an explanation of data analysis.

Demographic Information

The data will be collected through respondents in the form of different descriptive tests. The demographic information about, age, height, weight etc. will be obtained before seeking training.

Sampling Method:

Purposive sampling method will be used, as the researcher selected young girls with a specific purpose.

Target of population

Total 100 Swimmers and 100 football players will be the target population of the study .

Research design:

The design in a research study refers to the researcher's overall plan for answering the researcher's question or testing the research hypotheses. This study involves a cross sectional, comparative three group's non experimental descriptive research design.

Sample Size

In the present study, Total 200 players (100 Swimmers and 100 football players They will be the students of graduate Course and their age ranged from 18 to 25 years.

Selection of variables :

The following variables will be selected for the study**:**

Experimental Variables

The experimental variables used in the present study will be:

Physiological Variables

i. Vital capacity

a) Forced vital capacity (FVC)

b) Forced expiratory volume in first second (FEV1)

c) Peak expiratory flow rate (PEFR)

ii. Blood Pressure

a) Systolic blood pressure

b) Diastolic blood pressure

iii. Hear rate

iv. Rate pressure product

v. *Respira*tory pressure

a) Maximum expiratory pressure

b) Maximum inspiratory pressure.

c) Breath holding time

Tools of the study

S.No.	Components	Equipments
1.	Forced Vital Capacity	Spirometry
2.	Forced expiratory volume	Spirometry
3.	Peak expiratory flow rate	Spirometry
4.	Systolic blood pressure	Electronic blood pressure Device
5.	Diastolic blood pressure	Electronic blood pressure device
6.	Pulse rate	Pulse meter
7.	Maximum expiratory pressure	Manometer
8.	Maximum inspiratory pressure	Manometer
9.	Breath holding capacity	Digital stop watch

Reliability of the instruments

The instruments like Spiro meter, Mercury, Manometer, Electronic blood pressure Device, , Digital stop watch , Weighing Machine, Stadiometer and other instruments will be manufactured by standard companies. Therefore, the instruments will be standardized and reliable.

Test Administration of Variables

Vital Capacity

Purpose:

To measure (i) Forced Vital Capacity

(ii)Forced Respiratory Volume in First Second

(iii) Peak Expiratory Flow Rate.

Equipment used:

Spiro meter, Disposable cardboard moth pieces, sprit and cotton.

Procedure:

The both groups will be asked to sit easily on the chair and to take maximum inspiration away from the Spiro meter. Then they will be asked to hold the mouthpiece between the lips to create a good seal and expire as fast and as hard as possible for as long as possible until no breath will be left. Once again he will be asked to hold the mouth piece between the lips to create a good seal and breathe in and out for 2-3 tidal breaths. Then to inhale rapidly to maximum capacity. Expire as fast and as hard as possible for as long as possible until no breath will be left. The subject had to be encouraged continuously to ensure the best effort. Furan acceptable test, the effort should be maximal smooth and cough free and exhalation time at least 6 seconds. Each manoeuvre had to be performed thrice and the best value out of the three will be noted.

Scoring:

Forced vital capacity, Forced expiratory volume first second and peak expiratory flow rate values will be to be immediately recorded from Spiro meter.

Body Mass Index:

Body Mass Index will be measured by individual's body mass divided by the square of his height.

Resting heart rate:

Resting heart rate of each subject will be recorded before & after training. Before recording Resting heart rate the subject will be instructed to remain lying on their bed to record the heart rate, pulse rate will be recorded by the palpation at redial artery per minute. The score will be express in number of pulse rate per minute

Blood Pressure

The blood pressure is the pressure of the blood within the arteries. It is produced primarily by the contraction of the muscle. Electronic Blood pressure machine will be used to measure the blood pleasure of sample

Purpose:

To measure the Diastolic pressure, Diastolic pressure and Rate pressure product of the Meditation, Pranayama and control groups.

Equipment used:

A standardized digital blood pressure device (Omron).

Procedure:

The Meditation, Pranayama and groups will be asked to sit easily on the chair before the measurement will be taken. The cuff of the blood pressure device will be wrapped around the arm evenly with the lower edge approximately one inch above the antecubital space. The index of the diastolic pressure will be noted in mm of Hg, when the heart beat sound completely ceased.

Scoring:

Blood pressure will be applied by means of the pressure ball, and with the left hand palpating the pulse, the pressure will be continued for about a further 10mm Hg, above the point of pulse disappearance.

Rate Pressure Product

Rate pressure product will be calculated as the product of heart rate (HR) and Diastolic pressure will be divided by 100 (RPP = HR XSP X 10).

Respiratory Pressure Purpose:

To measure the maximum expiratory pressure, and maximum aspiratory pressure of maintaining breath hold.

Equipment used: manometer, sprit, cotton, forceps and stop watch.

Procedure:

The Meditation, Pranayama and groups will be asked to sit on a chair easily and the equipment height will be adjusted to the subject head level. Maximum expiratory pressure will be determined by asking the subjects to blow against a mercury column after taking in a full breath. (i.e to TLC) and to maintain to column at the maximum level for about 2seconds.Maximum aspiratory pressure will be determined by asking the subject to perform maximal inspiratory effort against the mercury column after breathing out fully (ic to RV). The maximum inspiratory pressure that could be maintained for about 2 seconds will be noted. The lips will be secured tightly around the mouth piece with the help of fingers to ensure that there will be no leak.

Scoring:

Maximum expiratory pressure, Maximum inspiratory pressure of maintaining breath holding values will be recorded three times for each subject. The values will be taken from the best of three similar readings.

Health outcomes Questionnaires:

In assessing the health outcomes, the Medical Outcome Study: Short-form 36 (MOS SF-36) that was developed by Ware, Snow, Kosinski, Gandek (1993) was used. It assesses following health concepts including: Perceived general health (Health status); Physical functioning (Rate of Health); Social functioning (Activity). Bodily Pain (Body Pain); Vitality (Pain with Normal Work); Physical role (Problem of daily physical health); Emotional role (Emotional Problem); and Mental health (Normal Social Activity), Change in Health (Level of feeling), Problem interfered social Activity (Energy and Fatigue) and Current Health Perception. Standardization of raw scores was obtained following the suggestion of the Manual and Interpretation Guide (Ware, 1993). It provides a comprehensive view of a person's health status.

Ethical Consideration:

In this research study the researcher Follow to ethical guidelines, principles, and standards for studies conducted with human beings .The study will be include safeguards for protecting humans,

The inclusion criteria are:

1. The participant will be agreeing to participate in the study.
2. The participants must be college girls in their aged range will be 18 to 25 years.
3. The participants will be not rotating through other health facility at the time of study.

The exclusion criteria are:

1. The participants advised not to participate if under any physiological or psychological disorders.
2. Inability to enrol regular practice programme of the respondent.
3. Presence of chronic medical conditions such as asthma, heart disease or any other condition and
4. Participants not less than aged of 18 and more than 25 years.

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